PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416	
P06468PC00		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/SE2003/001963	17-12-2003	
International Patent Classification (IPC) or national classification and IPC		
See Supplemental Box		
Applicant		
Telefonaktiebolaget LM Ericsson (publ) et al		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *(sent to the applicant and to the International Bureau)* a total of 6 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s))
      _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
   - ☒ Box No. I Basis of the report
   - ☐ Box No. II Priority
   - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - ☐ Box No. IV Lack of unity of invention
   - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - ☐ Box No. VI Certain documents cited
   - ☐ Box No. VII Certain defects in the international application
   - ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
01-06-2005	23-03-2006
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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of: Cover sheet

International patent classification (IPC)

H04Q 7/36 (2006.01)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2003/001963

Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____ ,
which is the language of a translation furnished for the purposes of:

☐ international search (Rules 12.3(a) and 23.1(b))

☐ publication of the international application (Rule 12.4(a))

☐ international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

☐ the international application as originally filed/furnished

☒ the description:

pages 1-3, 5-20 as originally filed/furnished
pages* 4 received by this Authority on 2006-02-20
pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 21-25 received by this Authority on 2006-02-20
pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-4 as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____
☐ the claims, Nos. _____
☐ the drawings, sheets/figs _____
☐ the sequence listing *(specify)*: _____
☐ any table(s) related to the sequence listing *(specify)*: _____

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/SE2003/001963

Box No. V **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-23	YES
	Claims		NO
Inventive step (IS)	Claims	1-23	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-23	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Reference is made to the following documents:

D1: WO 021040554 A1
D2: WO 03069938 A1
D3: 3GPP TR 25.881 V5.0.0" Improvement of RRM across RNS and *NS/BSS (Release 5)" 3:RD Generation Partnership Project; technical Specification Group Radio Access Network pages 10-15.

The problem to be solved by the present invention may therefore be regarded as methods and arrangements for managing radio resources in a communication system comprising access networks using different access technologies, which allow for simple adaptation and expansion of the system with new access networks using new access technologies.

The solution to this problem proposed in claim 1, 12 and 23 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Claims 2-11 and 13-22 are dependent on claim 1 and 12 as such also meet the requirements of the PCT with respect to novelty and inventive step.

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SUMMARY OF THE INVENTION

As mentioned above, a modern communication system consists of access networks using different access technologies. The radio resources in the communication system need to be managed in order to connect a terminal in the system to the access network that has the best connection for the user's current communication purpose, and in order to achieve efficient use of the radio resources in the communication system. The solutions of today are especially configured to each access technology in the system such that each interface to a common radio resource handler is standardised. Therefore, if a new access network using a new access technology is to be merged into the system, with today's solution all new interfaces to the common radio resource handler needs to be standardised for the radio resource handler to be able to talk to the different nodes in the new access network. Consequently, great effort is needed and a long time will elapse before it is possible to merge a new access technology into such a solution.

An object of the invention is to achieve a solution for managing radio resources for providing wireless access to a communication system consisting of access networks using different access technologies, and wherein the solution can easily be adapted to manage radio resources for providing wireless access to a system that is expanded with new access networks using new access technologies.

The above stated object is achieved by means of a method according to claim 1, a system according to claim 12 and a listening agent according to claim 23.

The solution according to the present invention makes it possible to manage radio resources in a communication system consisting of access networks using different access technologies. By extracting access relevant information from existing messages within an access network, a new access network using a new technology can easily be added to the communication system and managed by a solution for managing radio resources according to the invention.

According to a first aspect of the present invention, a method is provided for managing radio resources for providing wireless access to a communication system to a number of terminals. The communication system comprises a first access network using a first

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CLAIMS

1. A method for managing radio resources for providing wireless access to a communication system to a number of terminals (130), wherein the communication system comprises a first access network (120) using a first access technology and at least one second access network (110) using at least one second access technology different from the first access technology, wherein the method comprises the step of

receiving access relevant information from the first access network (120) and the at least one second access network (110),

characterized in that

the received access relevant information comprises information extracted by sniffing messages sent within the first access network (120); and in that

the method further comprises the steps of:

comparing the received access relevant information extracted from messages sent within the first access network (120) to access relevant information received from the at least one second access network (110), and

determining which access network a terminal (130) should access based on at least the comparison of the received access relevant information extracted from messages sent within the first access network to the access relevant information received from the at least one second access network.

2. The method according to claim 1 wherein the first access network (120) is a wireless local area network.

3. The method according to claim 1 or 2 wherein at least part of the messages sent within the first access network (120) are messages sent between access points.

4. The method according to claim 3 wherein the at least part of the messages sent within the first access network (120) are defined by the Inter-Access Point Protocol (IAPP).

5. The method according to any of claims 1-4 wherein the extracted access relevant information comprises an identification of a terminal (130) and an identification of an access point that the terminal has associated with.

6. The method according to claim 1 or 2 wherein at least part of the access relevant information is extracted by sniffing user plane traffic for at least one terminal (130), which access relevant information is used to calculate traffic volume and/or throughput of the at least one terminal.

7. The method according to claim 1 or 2 wherein at least part of the messages sent within the first access network (120) are sent between access points and a router.

8. The method according to claim 7 wherein the at least part of the messages sent within the first access network (120) are defined by the Light Weight Access Point Protocol (LWAPP).

9. The method according to claim 1 or 2 wherein at least part of the messages sent within the first access network (120) are sent between at least one terminal and an access point.

10. The method according to any of claims 1-9 wherein at least part of the access relevant information extracted by sniffing messages sent within the first access network (120) indicates how frequently a channel was busy, which indicates a load of the channel.

11. The method according to any of claims 1-10 wherein the method further comprises the step of:

converting the received access relevant information extracted by sniffing messages sent within the first access network (120) and/or the access relevant information received from the at least one second access network (110) to comparable quantities prior to the step of comparing the received access relevant information extracted by sniffing messages sent within the first access network to the access relevant information received from the at least one second access network.

12. A system for managing radio resources for providing wireless access to a communication system to a number of terminals (130), wherein the communication system comprises a first access network (120) using a first access technology and at least one second access network (110) using at least one second access technology different to the first access technology, **characterized in** that the system for managing radio resources comprises

at least one listening agent (202, 203) arranged for:

extracting access relevant information for at least the first access network (120) by sniffing messages sent within at least the first access network (120);

sending the access relevant information to an access selection manager (201),

an access selection manager (201) arranged for:

comparing the received access relevant information extracted from the first access network (120) to access relevant information received from the at least one second access network (110);

determining which of the first access network (120) and the at least one second access network (110) a terminal (130) should access based at least on the comparison of the access relevant information extracted from the first access network (120) to the access relevant information received from the at least one second access network (110).

13. The system according to claim 13 wherein the first access network (120) is a wireless local area network.

14. The system according to claim 12 or 13 wherein at least part of the messages sent within the first access network (120) are messages sent between access points.

15. The system according to claim 14 wherein the at least part of the messages sent within the first access network (120) are defined by the Inter-Access Point Protocol (IAPP).

16. The system according to any of claims 12-15 wherein the extracted access relevant information comprises an identification of a terminal (130) and an identification of an access point that the terminal has associated with.

17. The system according to claim 12 or 13 wherein at least part of the access relevant information is extracted by sniffing user plane traffic for at least one terminal (130), which access relevant information is used to calculate traffic volume and/or throughput of the at least one terminal.

18. The system according to claim 12 or 13 wherein at least part of the messages sent within the first access network (120) are sent between access points and a router.

19. The system according to claim 18 wherein the at least part of the messages sent within the first access network (120) are defined by the Light Weight Access Point Protocol (LWAPP).

20. The system according to claim 12 or 13 wherein at least part of the messages sent within the first access network (120) are sent between at least one terminal and an access point.

21. The system according to any of claims 12-20 wherein at least part of the access relevant information extracted by sniffing messages sent within the first access network (120) indicates how frequently a channel was busy, which indicates a load of the channel.

22. The system according to any of claims 12-21 wherein the access selection manager (201) is further arranged for:

converting the received access relevant information extracted by sniffing messages sent within the first access network (120) and/or the access relevant information received from the at least one second access network (110) to comparable quantities prior to comparing the received access relevant information extracted by sniffing messages sent within the first access network to the access relevant information received from the at least one second access network.

23. A listening agent (202, 203) for use in a system for managing radio resources for providing wireless access to a communication system to a number of terminals (130), wherein the communication system comprises a first access network (120) using a first access technology and at least one second access network (110) using at least one second access technology different to the first access technology, **characterized in** that the listening agent (202, 203) is arranged for:

extracting access relevant information for at least the first access network by sniffing messages sent within at least the first access network; and sending the access relevant information to an access selection manager (201).

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